

## *Summary: Outdoor Recreational Use of Man-Made Lakes*

G. DOUGLAS HOFE, JR.

*Bureau of Outdoor Recreation, U.S. Department of the Interior  
Washington, D. C. 20240*

Water, outdoor recreation, and tourism are very often interdependent. A discussion on outdoor recreation or tourism usually leads to a discussion of some form of basic water resource: a lake, a stream, a pond, or a pool. The fascination man exhibits toward water in its many and varied forms is the basis for the present locations of many of the finest tourist centers of the world. A report by the *National Technical Advisory Committee* [1968] made the following observations:

It is not surprising that water has occupied an important position in the concerns of man. The fate of tribes and nations, cities, and civilizations has been determined by drought and flood, by abundance or scarcity of water since the earliest days of mankind.

Artists have reflected man's fascination with water. Literature and art of a variety of cultures dwell upon brooks, waves, waterfalls and lakes as superlative among the delights of the environment.

Aesthetically pleasing waters add to the quality of human experience. Water may be pleasant to look upon, to walk or rest beside, to contemplate. It may provide a variety of active recreation experiences. It may enhance the visual scene wherever it appears, in cities or wilderness. It may enhance values of adjoining properties, public and private. It may provide a focal point of pride in the community.

About one quarter of all U.S. outdoor recreation is dependent on the availability of water. Participation in swimming, fishing, boating, ice skating, and water skiing accounted for 2.8 billion activity days in 1965 and is projected to increase to 7.7 billion by the year 2000. The popularity of water-dependent outdoor recreational pursuits is further indicated by the following statistics. During the summer of 1965, 48% of the population 12 years of age and older went swim-

ming, 30% went fishing, and 24% went boating.

The presence of water adjacent to recreation and tourism centers adds an additional dimension to the importance of water. Activities such as camping, picnicking, walking for pleasure, driving for pleasure, and sight-seeing are enhanced by the presence of water; two thirds of all designated publicly administered recreation areas either have a water body within their boundaries or are adjacent to accessible water.

Man-made lakes provide expanded opportunities for both water-dependent and water-enhanced outdoor recreation use. Their development has created water surface areas where they were scarce or nonexistent before. The role of man-made lakes will increase sharply in the future as natural water bodies are used to capacity.

### OUTDOOR RECREATION IN RIVER BASIN PLANNING AND DEVELOPMENT

Before I discuss man-made lakes and their problems and opportunities, a brief review of the emergence of outdoor recreation in water resource development as it generally relates to our oldest water resource agency, the U.S. Army Corps of Engineers, is in order.

The federal government constructed only a few reservoirs prior to the first Flood Control Act in 1936. Construction on a large scale began in the late thirties, but it was nearly stopped during World War II. After the war the reservoir construction program was greatly increased. During the postwar years the increasing American population found it had more leisure time, more disposable income, and more mobility for outdoor recreation activities. Reservoirs constructed primarily for navigation, flood control, hydroelectric power, irrigation, and similar purposes became an important recreational resource.

The rapid growth in the demand for recreation at and the use of federal reservoirs created new problems in policies, planning procedures, economic evaluation, and cost sharing.

The heart of the U.S. Army Corps of Engineers' recreation authority is in section 4 of the 1944 Flood Control Act, which states that the chief of engineers is authorized to construct, maintain, and operate public park and recreational facilities in reservoir areas under the control of the Department of the Army and to permit the construction, maintenance, and operation of such facilities. Although the section has been amended several times, the most important amendment was in 1962, when the recreation authority was broadened to cover all types of water resource projects. This authority gave the army considerable latitude for federal involvement in the planning and development of recreation at reservoirs. However, the Bureau of the Budget and the appropriations committees of Congress generally held to a minimum the responsibility of developing the recreation potential of reservoirs.

In 1958, Congress enacted the Fish and Wildlife Coordination Act, which provided for equal consideration of fish and wildlife conservation along with other purposes of water resource developments and for some additional opportunities to include recreation in reservoir planning and development.

In 1960 the Senate's Select Committee on National Water Resources published its comprehensive appraisal of the water resources of the nation and needs for their conservation and development. The report recognized that a major part of the outdoor recreation potential is associated with water areas and recommended adoption of the policy that the recreational potential of all federal reservoirs be developed for public use.

The Outdoor Recreation Resources Review Commission, in its 1962 report to the President and Congress, recommended that recreation be given full consideration in the planning, design, and construction of water resource projects. The commission also pointed out that water is a prime factor in most outdoor recreation activities.

Two important pieces of legislation, the Federal Water Project Recreation Act and the Water Resources Planning Act, were passed in 1965. The basic purpose of the Federal Water

Project Recreation Act was to assure that 'full consideration' be given to the opportunities that a water resource project affords for outdoor recreation and for fish and wildlife enhancement. The act also required that nonfederal public bodies bear not less than one-half the separable costs of the project allocated to recreation and fish and wildlife enhancement and all the costs of operation, maintenance, and replacement associated with recreation and fish and wildlife.

The objective of the Water Resources Planning Act was to provide for the optimum development of the natural resources of the nation through the coordinated planning of water and related land resources, the establishment of a Water Resources Council and river basin commissions, and the provision of financial assistance to the states to increase state participation in such planning. The Water Resources Council is charged with establishing principles, standards, and procedures for federal participants in the preparation of comprehensive regional or river basin plans and with formulating and evaluating federal water and related land resource projects.

The Wild and Scenic Rivers Act, passed in 1968, provided a missing link in water resources planning. Through the act,

... Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

At this point I would like to refer to two actions that can add significant new dimensions to water development projects. First, is the President's proposed reorganization of the executive branch. One of the purposes of this reorganization is to coordinate the planning of projects better so that we get the most benefit from every dollar expended.

Also, a growing concern for the enhancement and preservation of the environment has caused us to reexamine the old planning concepts in water resource development. No longer does a project deserve construction merely because it provides multiple purposes. The National Environmental Policy Act of 1969 requires that the

effect of a project be examined in relation to all purposes, including outdoor recreation, and that any effects on the environment be fully evaluated. My opinion is that this blending of man-made lakes with the overall goals of environmental protection will be the single most important aspect of water resources development in this country and the world.

#### RECREATION USE OF MAN-MADE LAKES

I highlighted earlier the importance of water to outdoor recreation and tourism. Four U.S. agencies have the primary responsibility for the planning and development of federally assisted water projects in this country. They are the Tennessee Valley Authority (TVA), the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the Soil Conservation Service. Through the efforts of these agencies, thousands of man-made impoundments have been made available for recreation purposes and use.

Almost 262,600 ha of reservoir water surface and over 17,699 km of shoreline provided by TVA reservoirs have furnished the basis for a flourishing development in water-based recreation that has expanded steadily over 30 years. In 1969, for example, use of the impoundments for swimming, water skiing, boating, and fishing and use of adjacent areas for camping, picnicking, and other leisure-time activities resulted in a total of almost 47 million visits.

Attendance at U.S. Army Corps of Engineers reservoirs has increased from 16 million in 1950 to 276 million in 1970. The corps operates some 300 reservoirs providing over 1,616,000 ha of water surface area for public use. Facilities range from primitive campsites providing only minimum facilities for the health and safety of visitors to elaborate marine hotel complexes offering facilities for people unwilling or unable to cope with a primitive experience.

During the past decade, visitor days of recreation use increased about 170% at Bureau of Reclamation projects, from about 20 million visitor days in 1958 to 54 million in 1969. Federal reclamation projects provide 686,800 ha of water surface, 18,664 ha of shoreline, 640 developed campgrounds, 767 picnic areas, and 23,400 tent and trailer spaces.

Although the Soil Conservation Service is limited to providing assistance to states and local units of government for lakes of <25,000 acre-feet of storage for all purposes, it has contributed

greatly to outdoor recreation opportunities. Throughout the United States, construction of over 5500 watershed structures has been assisted by the Soil Conservation Service. Since 1962, when recreation became a project purpose, over 400 of these reservoirs have been built with planned public recreation facilities. Although they are not comparable in size individually with the large lakes created by the agencies cited previously, their number and ready availability within short travel distances make these lakes an important factor in the water recreation picture.

Although the Federal Power Commission is not a construction agency, it has an important mission in promoting the installation of recreational facilities at the projects that it licenses. In seeking to assure that the natural resources of the nation are made available to all citizens, the commission has licensed 515 reservoirs providing a combined water surface area of 727,200 ha and approximately 5200 public access areas.

In addition to the specific agencies mentioned above, many states, cities, counties, private corporations, and individuals have constructed impoundments for a variety of purposes, including water supply and power generation. An additional benefit of such construction is outdoor recreation.

#### ECONOMIC IMPACT OF TOURISM AT MAN-MADE LAKES

Many people have attempted to measure the economic impact of recreation, an activity that produces benefits that are largely intangible. Measuring recreation impact is more difficult than measuring industrial impact because there is no central source for expenditure data. Recreationists visit the area only briefly and are difficult to identify and observe. Their economic expenditure records are unwritten and uncertain. Nevertheless, most experts agree that man-made lakes and the associated development of recreation facilities and tourist centers do generate a substantial impact, parts of which occur in the immediate reservoir area.

*Badger* [this volume] observes that the creation of new man-made reservoirs and the development of recreation facilities win new converts to water-based outdoor recreational activities and stimulate additional use by 'preconditioned users.' Fishermen, boaters, and water skiers quickly move onto reservoirs as they are com-

pleted and have tremendously increased the use of water-based recreational facilities. He uses an input-output analysis with a 17-sector model to measure the economic impact of water and related land-based recreational facilities on the regional economy.

A recent report by the Bureau of Reclamation provided similar conclusions. They found that recreationists visiting Shadow Mountain Lake and Lake Granby had a mean expenditure for the visit of \$36.98 within a 40.23-km radius of the reservoirs, or \$3.05 per visitor day. The average group visiting Horsetooth Reservoir spent \$10.15 during their visit, or \$1.16 per visitor day.

Increases in property values due to the three reservoirs between 1946 and 1968 totaled \$8,134,000 distributed as follows: land value, \$5,160,000; improvements, \$2,152,000; and recreational facilities, \$822,000. The annual recreation-related impact for the three reservoirs during 1968 totaled \$4,882,000 distributed as follows: retail sales, \$2,912,000; boat sales, \$1,792,000; and operation and maintenance costs of recreation facilities, \$178,000.

The impact of individual man-made lakes depends on the location, the type of development, and many other factors, but, as can be seen, it is substantial.

#### PROBLEMS AND OPPORTUNITIES

A great number of outdoor recreational activities are either dependent on or enhanced by water. With increases in population, income, mobility, leisure time, and education coupled with changes in age group relationships and technology, recreation may well be the primary nonconsumptive goal of water resource development in the future. Even the short-range demand for water-based outdoor recreational activities may very well surpass the wildest dreams of all water resource planning and development organizations. If future demands for recreation are to be met, a close look at all existing and planned projects, regardless of size, must be made. These must be developed to their highest recreational potentials. In other words, water resource projects should be maximized for recreational benefits.

With the ultimate goal of providing various types of high-quality recreational facilities capable of meeting the demand in future decades, the general problems focus on five major areas: legislation, conflicts, research, quality, and quan-

tity. The nature and complexity of the recreation picture makes a clear-cut distinction between these areas almost impossible. A discussion of any one area overlaps with discussions of the others.

*Legislation.* Many of the problems that will be mentioned in my subsequent discussion will require changes in existing policy or initiation of entirely new legislation. Advances are presently being made in some of these areas, but others are still left untouched. Some advances expected in the upcoming decades will deal with single-purpose water resource developments for recreation and alternative cost-sharing programs. I assume that legislative problems are not common only to this country.

*Conflicts.* Conflicts with other uses of both land and water resources are presently, and will continue to be in the future, major problems of concern to recreation planners. Developments for each use must lie within reasonable limits of compatibility with other uses. For example, the pool levels for flood control, power generation, and water storage purposes must fluctuate, but constant-level pools are most ideal for recreational use. Although conflicts with present uses of water and related land areas are expected to dwindle in the future, there will undoubtedly be conflicts between recreation and other unforeseen water uses.

Various recreational activities also compete and are often in direct conflict with one another. Certain areas will have to be closed to particular uses if ultimate quality and quantity standards are to be met. This zoning practice, little used today, will be of increasing importance in future decades.

*Research.* Despite fine individual efforts in recreation research, little is known about the total recreation picture. All phases of recreation, from the design and maintenance of facilities to sociologic and environmental factors affecting recreational motivation and use and demand estimation, are in need of further study.

The resource planner can make sound decisions concerning outdoor recreation and resource allocation only after all effects and contributing factors have been analyzed properly.

*Quality.* The final judgment in determining a quality recreational experience rests with the recreationist. Our problem in this area is to provide the controls that will insure compliance with known standards relating to quality (even

though they are inadequate). Often more research into the effects of various elements on quality is needed along with further research on visitor preferences and satisfaction. Specific areas requiring additional study are water quality, site quality, esthetic quality, and the contributions and effects of these factors on the quality of the recreational experience.

Problems are common near many water resource development projects. However, the complexity and extent of such problems vary with the development. We must concern ourselves with the total recreation and tourism environment. The planner's task does not stop at the edge of the water.

*Quantity.* Present estimates of the amounts and kinds of outdoor recreation activities and facilities that will be needed in the future are based on present use patterns and conditions. Experience has taught us that predictions about what people wish in the way of outdoor recreational experiences cannot be estimated with certainty. Creation of additional recreational resources must have a limit. Beyond this limit, which will probably be reached in the next few decades, fuller use of existing resources and facilities will be the only solution.

There are many specific problems that are included in one or more of these general problem areas. The following are some of the more important of these specific problems that are either current or can be anticipated in the future.

*Improvement of existing recreational areas and facilities.* At the present time, many man-made lakes have not been developed to their full potential. The ultimate development of existing recreation resources should be considered in conjunction with new lake areas. Also, as advances are made in design and more is learned about the recreationist, these advances should be applied to existing recreational developments at previously constructed lakes in addition to new or planned impoundments.

*Zoning for recreational use.* In the future, compatibility between water-related activities may well depend on the zoning of recreational areas, which may be done by: (1) defining the purpose of a recreation area and allowing only those activities that are compatible with one another and with the general purpose or (2) zoning activities at multipurpose recreation areas so that conflict does not arise. Water may be zoned for fishing, swimming, boating, and water skiing.

*Role of recreation in multipurpose water resource developments.* There must be compatibility; the limits within which each use can function purposefully and economically must be calculated. Somewhere within the limits of each use, there is likely to be a common area of fluctuation, where all uses are compatible. Although in this common area the ultimate economic benefit may not be realized for any single use, the ultimate multiple economic benefit may be realized.

Sometimes recreation should be considered the primary purpose of a water impoundment, and flood control and hydroelectric power should be considered secondary. Then the limits of water level fluctuation that can be tolerated from a recreation point of view would serve as the guidelines within which the water level most desirable for flood control and hydroelectric power must fall.

*Single-purpose recreation developments.* At some point in the future, recreation may be considered the sole purpose of many more water impoundments. Such a time will come when dams or reservoirs are no longer needed or desirable for power, flood control, or navigation purposes.

When we reach such a point, people will have more leisure time, both a longer vacation and a much longer weekend. Thus much more use would be made of any recreation area. Such an area could receive on weekdays the intensive use that it receives, at present, on Sundays. Therefore, without additional facilities, weekly use of the area due to greater activity throughout the weekdays might be 3 times the present weekly use.

*Location of water resource developments and recreational use.* Activities to be included at a project or the general purpose of a project should vary according to location. For example, a project located near heavily populated areas will serve urban day use recreational wants. It will receive intensified use, and such use will probably not deteriorate the value of the resource. A wilderness area and a weekend use area will receive far different patronage, and the function or purpose will differ from that of the urban day use area.

In the future, more stress should be placed on small water impoundments located near cities, which would serve the growing needs of the rapidly expanding population of our metropolitan areas.

*Floodplain zoning for recreational use.* More should be done to encourage preservation of green areas along many waterways. These areas would provide excellent opportunities for seasonal recreational use and eliminate many costly water resource developments for flood control purposes. Floodplain zoning for recreational use would be of extreme importance in urban areas, where flood damages are greatest and outdoor recreational resources are scarce.

When our thinking 'evolves' to a point where we start planning in terms of 'flood damage reduction,' then floodplain zoning, green belts, and flood-proofing techniques will logically be forthcoming.

#### CONCLUSION

In summary I would like to emphasize the following points.

1. Water is an important ingredient to the outdoor recreation experience. Man-made lakes are one means of providing water-dependent and water-related opportunities.

2. The integration of outdoor recreation and associated environmental concerns in the characteristic framework for water resource development has been a slow process and is continuing to evolve.

3. Man-made lakes provide one alternative solution to providing water for recreation and tourism. A balance among reservoirs, natural streams, and rivers is needed in recreational development.

4. Outdoor recreation and tourism, as they relate to water, provide a challenge in both problems and opportunities. Lack of information

in many areas and the dependency of the total outdoor recreation experience on the environment in which it occurs furnish both a challenge and a problem. The opportunity to provide needed water-related areas and facilities within reach of all segments of the population is yet another challenge. On the subject of opportunity I would like to stress the importance of acquiring the needed land base adjacent to water areas for both initial and future development. Without this basic resource the potential of many water areas for recreational use is severely restricted.

5. The economic impact of recreation reservoirs can be substantial. It influences areas in the immediate vicinity of the development as well as the areas from which the visitors originate. The impact is exhibited in many ways, including increased land values, retail sales, boat sales, increased investment in land improvements, and additional employment.

6. Outdoor recreation is a valid objective of water development and can occur in conjunction with and to the mutual benefit of other water uses, both consumptive and nonconsumptive. Proper planning with these objectives in mind can help to provide a better environment in which we all can live, work, and play.

#### REFERENCES

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